

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
3578

In Re Application Of: SCHANZ, G., ET AL

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/563,354	05/18/2006	ZALASKY, K.	278	1797	4394

Invention: EXTRACTION METHOD USING...

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10/18/2010

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Gerhard Schanz
Serial No.:	10/563,354
Filed:	05/18/2006
Group Art Unit:	1797
Examiner:	Katherine M. Zalasky
Title:	Extraction Process Using a Static Micromixer

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
Board of Patent Appeals and Interference
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Sir:

This Appeal is from the Examiner's Advisory Action mailed from the U.S. Patent and Trademark Office 23 September 2010, maintaining the Final Rejection of claims 1-23 in the Final Office Action transmitted from the U.S. Patent and Trademark Office on 17 August 2010.

A Notice of Appeal in response to the 23 September 2010 Advisory Action was filed on 18 October 2010. The requisite fee under 37 C.F.R. § 41.20(b)(2) for filing this Appeal Brief in the amount of \$540 is submitted herewith.

This Appeal Brief is filed within the two-month period prescribed by 37 C.F.R. § 41.37(a)(1), set to expire 18 December 2010. Accordingly, it is believed that no extension of time is required.

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I. REAL PARTY IN INTEREST:

The real party in interest is Proctor & Gamble Service GmbH, the assignee of record.

II. RELATED APPEALS AND INTERFERENCES:

Appellant, Appellant' representative, and the Assignee are not aware of any prior or pending appeals, interferences, or judicial proceedings that may be related to, directly affect, be directly affected by, or have a bearing on the Board's decision in this pending appeal.

III. STATUS OF CLAIMS:

Claims 1-23 are pending in the application and are rejected under 35 U.S.C. 103(a) and 35 U.S.C. 112, second paragraph. Appellant appeals the rejections of claims 1-23.

IV. STATUS OF AMENDMENTS:

The amendment filed 13 September 2010 was not entered. The claims are in their form as amended in the amendment filed 28 May 2010.

V. SUMMARY OF CLAIMED SUBJECT MATTER:

The claimed subject matter defined in independent claims 1, 20, and 22 includes reference to parts of the specification. The following description is exemplary and is not a surrender of other aspects of the present invention that are also enabled by the present specification and within the scope of the claims.

Independent **claims 1 and 20** relate to a process for extracting a substance from one of at least two immiscible fluid phases comprising the steps of:

- a) providing at least a first fluid and a second fluid that, after mixing, form at least two immiscible fluid phases, wherein the first fluid contains at least one substance that is extractable by the second fluid;
- b) mixing the first fluid and second fluid by means of at least one static micromixer; and
- c) allowing the at least two immiscible fluid layers to separate
wherein said at least one static micromixer comprises at least one component in the form of a disk (page 2 in the specification).

Claim 1 additionally recites the limitations:

- said disk comprises a single mixing zone,
- at least one inlet opening disposed in a plane of said disk for introduction of at least one feed stream into a linking channel,
- at least one outlet opening disposed in the plane of said disk for outflow of the feed stream directly into said single mixing zone,
- said at least one inlet opening is connected with said at least one outlet opening in a communicating manner via said linking channel which is disposed in the plane of said disk;
- said linking channel is divided once into more than two part channels by microstructure parts immediately prior to opening into the mixing zone,
- each of the part channels has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone; and

said microstructure parts are in contact with said mixing zone but not with said at least one inlet opening (page 2 in the specification and the figures).

Independent **claim 20** differs from independent claim 1 in two respects:

1. Claim 20 does not include the limitation that microstructure parts are in contact with the mixing zone.
2. Claim 20 includes the limitation that the part channels have a length that is sufficient for flow control but which minimizes pressure for a given throughput (last full paragraph on page 3 of the specification).

Independent **claim 22** relates to a process for extracting a substance from one of at least two immiscible fluid phases, said process comprising the steps of:

- a) delivering a first feed stream of a first fluid from a first inlet opening of a static micromixer through a first linking channel to a first outlet opening and directly into a mixing zone of said micromixer, said first feed stream being divided only by microstructure parts into part channels immediately prior to entering said mixing zone;
 - b) delivering a second feed stream of a second fluid to said mixing zone (5);
 - c) mixing the first fluid stream with the second fluid stream in the mixing zone;
- and

d) allowing the first and second fluids to separate

wherein:

said first fluid and said second fluid are immiscible and said substance is extracted from the first fluid into the second fluid or said substance is extracted from the second fluid into the first fluid;

said static micromixer comprises at least one component in the form of a disk;
said disk comprises a single mixing zone;

said first inlet opening, said first outlet opening, and said first linking channel are disposed in the plane of said disk;

each of the part channels has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone; and

said microstructure parts are in contact with said mixing zone but not with said at least one inlet opening. (page 2 in the specification and the drawings)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL:

Whether claims 1-23 are unpatentable under 35 U.S.C. § 112, second paragraph, as being indefinite over the meaning of the limitation "said microstructure parts are not *in contact with* said inlet opening."

Whether claims 1-23 are unpatentable under 35 U.S.C. § 103(a) as being obvious over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169).

VII. ARGUMENT

A. Claims 1-23

Whether claims 1-23 are unpatentable under 35 U.S.C. § 112, second paragraph, as being indefinite over the meaning of the limitation “*said microstructure parts are not in contact with said inlet opening.*”

From the MPEP 2173.02: “The requirement to ‘distinctly’ claim means that the claim must have a meaning discernible to one of ordinary skill in the art when construed according to correct principles....Only when a claim remains insolubly ambiguous without a discernible meaning after all reasonable attempts at construction must a court declare it indefinite.” (Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354, 1366, 71 USPQ2d 1081, 1089 (Fed. Cir. 2004)). Accordingly, a claim term that is not used or defined in the specification is not indefinite if the meaning of the claim term is discernible. Bancorp Services, L.L.C. v. Hartford Life Ins. Co., 359 F.3d 1367, 1372, 69 USPQ2d 1996, 1999-2000 (Fed. Cir. 2004) (holding that the disputed claim term “surrender value protected investment credits” which was not defined or used in the specification was discernible and hence not indefinite because “the components of the term have well recognized meanings, which allow the reader to infer the meaning of the entire phrase with reasonable confidence”).

One of ordinary skill would have no doubt as to the metes and bounds of claims 1-23 or the meaning of “*not in contact with.*”

Claims 1-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention. In the Final Rejection dated 08/17/2010, the Examiner asserts that the limitation that the microstructure parts are “*not in contact with*” the inlet opening is indefinite.

Independent claims 1 and 22 recite the limitation "*said microstructure parts (6) are in contact with said mixing zone but not with said at least one inlet opening (2).*"

Independent claim 20 recites the limitation "*said microstructure parts (6) are not in contact with said at least one inlet opening (2).*"

Appellant argues that the Examiner errs in asserting that the limitation "are **not** in contact with" is indefinite with respect to the relative positions of microstructure parts within the context of the rejected claims because the prosecution history clearly shows that the limitation "**are in contact with**" is definite with respect to the very same microstructure parts. The limitation "*wherein ... said microstructure parts **are** in contact with said mixing zone*" has been examined without rejection as being indefinite in at least three consecutive Office Actions. Paragraph 4 of the Final Rejection dated 10/14/2009 cites **Ehrfeld** et al. (US 2003/0039169) as teaching the limitation "*said microstructure units are in contact with said mixing zone.*" Page 4 of the Final Office Action dated 08/17/2010 identifies **Schubert** et al. (US 6,082,891) as teaching "*said microstructure parts are in contact with said mixing zone.*" Appellant respectfully submits that the insertion of "**not**" into the definite limitation "*in contact with*" to recite "*not in contact with*" does not introduce indefiniteness.

Appellant argues that the definiteness "*said microstructure parts are (...) not in contact with said inlet opening*" is supported by specification as well as the Examiner. Paragraph 4 on page 2 of the Final Rejection dated 08/17/2010 indicates that the limitation of microstructure parts not being in contact with the inlet opening can be inferred from the figures in the present specification and that the figures show the microstructure parts "*spaced away from the inlet opening.*" The Examiner supports the rejection as follows:

"The microstructure parts of the instant invention are not in direct contact with the inlet opening, but surely they are in indirect and fluidic contact with the inlet opening, since the fluid must pass into the opening, then into the

linking channel, and finally into the microstructure parts. For the purpose of examination, the claim limitation has been interpreted as meaning that the microstructure parts are not directly in contact with the inlet opening."

Here, the Examiner seems to use a definitive interpretation of the claim limitation "not in contact with" that is supported by the specification to argue that the very same limitation is indefinite. It is clear from the specification that microstructure parts must indirectly be in fluid contact with the inlet opening as a direct consequence of the way the components recited in the rejected claims are arranged. The Examiner interprets "contact" to mean "direct contact" with respect to the microstructure parts and the inlet opening, which is consistent with the limitation recited in the rejected claims that the linking channel is separated into part channels by microstructure parts immediately prior to opening into the mixing zone. If the microstructure units were to extend to and contact the inlet opening, there would be no single channel separated into part channels but, instead, separate channels.

In response to the Final Rejection of claims 1-23, and for the sole purpose of advancing prosecution without delay, Appellant amended claim 1 on 09/13/2010 to recite "direct contact" in place of "contact" with regard to the position of microstructure parts relative to the mixing zone and inlet opening. The Examiner refused entry of the amendment because the amendment allegedly narrows the scope of the claim and therefore requires additional search of the prior art.

B. Claims 1, 20, and 22

Whether claims 1, 20, and 23 are unpatentable under 35 U.S.C. § 103(a) as being obvious over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169).

"To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

1. The Examiner has not established, prima facie, that the artisan would have found the claimed invention obvious in light of the teachings of the cited references because the references, neither individually nor in combination, teach or suggest a linking channel that is divided once into more than two part channels.

Claims 1, 20, and 22 recite an extraction method in which two fluids are mixed by means of a static micromixer. The micromixer comprises a component in the form of a disk, which comprises a fluid inlet opening that is linked to a single mixing zone by a linking channel. The linking channel is divided once into more than two part channels by microstructure parts immediately prior to opening into the mixing zone.

With regard to the linking channel, claims 1 and 20 recite the limitation:

"said linking channel (3) is divided once into more than two part channels (7) by microstructure parts (6) immediately prior to opening into the mixing zone (5)."

With regard to the linking channel, claim 22 recites the limitation:

"delivering a first feed stream of a first fluid from a first inlet opening (2) of a static micromixer through a first linking channel (3) to a first outlet opening (4) and directly into a mixing zone (5) of said micromixer, said first feed stream being divided only by microstructure parts (6) into part channels (7) immediately prior to entering said mixing zone (5)."

The plain meaning of the language recited in present claims 1, 20, and 22 specifies a channel (i.e. a single channel) that fluidly connects an inlet into the channel and an outlet from the channel into a mixing zone. That same channel is divided into part channels immediately prior to opening into the mixing zone. Appellant submits that one of skill in the art would not reasonably interpret the division of a channel into part channels as encompassing separate channels of equal length because one would reasonably understand that a channel separated into part channels is not identical to separate channels.

The Final Rejection dated 08/17/2010 cites structural elements 4A and 4B shown in Figure 1 and described in column 2, lines 40-61, in Schubert as teaching the linking channel and microstructure parts recited in the above-quoted claim limitation. The rejection does identify two structures in Schubert that correspond to the inlet opening and linking channel recited in the rejected claims. Rather, the rejection appears to cite 7A as both the inlet opening into the linking channel and as the linking channel itself. Appellant points out that claims 1, 20, and 22 recite both the linking channel and the inlet opening as being in the plane of the disk. If one interprets 7A as an inlet opening, then there is no linking channel, only a plurality of separate passages. If one interprets 7A as the linking channel, then the linking channel (a channel must have a length) cannot be in the plane of the disk.

Figure 1 in Schubert shows a foil that is shaped to form parallel, curved arc-like grooves. Column 2, lines 40-61, discloses that the arc-like grooves form rows of passages 3A and 4B that extend from the rear face 6A to the center area 6C of the front face 8A of the foil. Line 61 in the same column to line 6 in column 3 discloses that fluid

admission chamber 7A for admission of fluid A' is arranged on the face 6A (FIG. 2) and that mixing chamber 9C is at the receiving end of passages 3A and 4A. It is clear from the figures and description in Schubert that the reference discloses a fluid inlet (chamber) 7A that is connected to mixing chamber 9C through a row of arc-shaped passages 4A.

In response to Appellant's argument above, paragraph 2 of the Advisory Action dated 09/23/2010 cites 3A and 3B in Schubert as equivalent to the part channels recited in claim 1 that divide admission chamber 7A and 7B into part channels. The Examiner also refers to inlet openings (plural, not singular as in the rejected claims) as being in contact with admission chamber 7A and 7B. The Examiner, therefore, interprets admission chambers 7A and 7B as the linking channel in the rejected claims (divided into part channels) and also as the inlet opening recited in the rejected claims. Claims 1, 20, and 22, however, clearly recite an (a singular) inlet opening into a (single) linking channel that is divided once into more than two part channels immediately prior to opening into the mixing zone. None of the structures linking admission chamber 7A to mixing zone 9C in Schubert is divided once into more than two part channels. Rather, Schubert teaches a micromixer in which rows of parallel arc-like channel link the admission chamber to the mixing zone 9C.

In the description of Figure 2 at column 3, lines 7-12, Schubert discloses that guide structure 6 has a *"series of arc-like curved passages 3A and 4B leading alternately from admission chambers 7A and 7B to the mixing chamber 9C..."* Schubert explicitly and unequivocally discloses a series of passages connecting an admission chamber to a mixing chamber. It follows, therefore, that each passage has an inlet in fluid communication with an admission chamber and an outlet in fluid communication with a mixing chamber. Each passage is an undivided passage from the admission chamber to the mixing chamber. Column 3, lines 27-32, discloses that pentagonal foils 1A, 1B (which form the rows of parallel passages) are stacked and provided with cover plates before being connected to admission chambers 7A, 7B, and mixing chamber 9C.

Appellant respectfully submits that the inlet opening, linking channel, part channels, and microstructure parts recited in present claims 1, 20, and 22 cannot reasonably be confused with the series of undivided passages of equal length connecting an admission chamber to a mixing chamber as disclosed by Schubert.

Neither Hemming nor Ehrfeld are cited as teaching, nor do they teach or suggest a micromixer comprising a linking channel that is divided once into more than two part channels.

2. The Examiner has not established, prima facie, that the artisan would have found the claimed invention obvious in light of the teachings of the cited references because the references, neither individually nor in combination, teach or suggest a linking channel comprising microstructure parts in contact with a mixing zone but not in contact with an inlet opening into the linking channel.

Claims 1, 20, and 22 recite an extraction method in which two fluids are mixed by means of a static micromixer. The micromixer comprises a component in the form of a disk, which comprises a fluid inlet opening that is linked to a mixing zone by a linking channel. The linking channel comprises microstructure parts that divide the linking channel once into more than two part channels immediately before opening into a single mixing zone. Claims 1 and 22 recite that the microstructure parts dividing the linking channel are in contact with the mixing zone but not in contact with the inlet opening. Claim 20 recites that the microstructure parts dividing the linking channel are not in contact with the inlet opening.

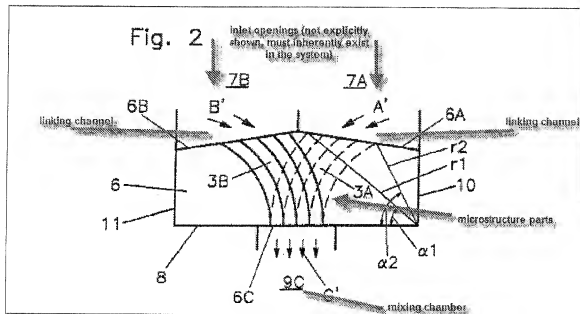
In the Final Rejection dated 08/17/2010, Hemming is cited as teaching a general process for extracting a substance from one of at least two immiscible fluid phases. The rejection establishes that Hemming does not teach a process in which fluids are

mixed or a substance is extracted by means of a static micromixer comprising a component in the form of a disc or a linking channel.

Schubert is cited in the Final Rejection as teaching all of the recited claims limitations related to a static micromixer and a linking channel, with the exception that the component comprising the linking channel is in the form of a pentagon and not in the shape of a disk. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to use the micromixer taught by Schubert to perform an extraction process taught by Hemming.

Ehrfeld is cited as teaching a static micromixer comprising a component in the form of a disk. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to replace the pentagonal component used by Schubert with the disk-shaped component taught by Ehrfeld because the two shapes are interchangeable and there is no evidence that the particular shape of the component is of significance.

The Examiner's interpretation of the Schubert is in error in several respects. The Examiner equates admission chamber 7A in Figure 2 of Schubert with both the inlet opening (2) and with the linking channel (3) recited in the rejected claims. The Examiner equates parallel grooves 2A and 2B (or parallel passages 3A, 4B) in Schubert to both the part channels (7) and linking channels (3) recited in the rejected claims. An annotated version of Figure 2 from Schubert used by the Examiner to support the rejection is reproduced below for convenience.



Annotated Figure 2

The Examiner cites column 2, lines 40-61, in Schubert in support of the rejection. This citation teaches "*a number of arc-like grooves 2A, 2B*" pressed into a foil and arranged to be closely adjacent to one another. When the foils are stacked, rows of passages 3A and 4B are formed. The set of grooves 2A "*extends in the shape of an arc from the right rear face 6A to the center area 6C of the front face 8A of the foil 1A.*" 6A is a flat face in direct contact with fluid admission chamber 7A. Figure 1 in Schubert clearly shows multiple, parallel channels linking a fluid inlet chamber with a mixing zone and not a linking channel divided by microstructure units immediately prior to opening into the mixing zone. Column 2, lines 10-24, in Schubert provide additional support for Appellant's interpretation that the reference teaches multiple parallel channels and not a single channel divided into part channels, as asserted by the Examiner.

Present claims 1 and 22 recite, in part, “*said microstructure parts (6) are in contact with said mixing zone but not with said at least one inlet opening (2).*” Present claim 2o does not require microstructure parts (6) to be in contact with the mixing zone.

On page 4 in the Final Rejection of 08/17/2010, the Examiner interprets the microstructure parts recited in the rejected claims as encompassing the walls 4A, 4B of the separate, parallel linking channels in Figure 1 of Schubert. This interpretation would be rejected by one of skill in the art based solely upon the language recited in the rejected claims because the claims are not to be interpreted in a vacuum. One of skill in the art would not confuse a linking channel separated into part channels by microstructure parts with the multiple, separate, parallel, arc-shaped channels of equal lengths between an inlet opening 7A and a mixing zone 9C taught by Schubert.

The Final Rejection does not address the limitation that the microstructure parts are not in contact with the inlet opening. Page 4 of the Final Rejection cites Schubert as disclosing microstructure parts *"in contact with said mixing zone but in direct contact with said at least one inlet opening (Figure 1 & 2, C2/L40-C3/L6)." Appellant respectfully submits that the language of the rejection implies that it contains a typographical error or that the Examiner misinterprets the rejected claims by not reading out "not" from "not in contact with."*

In the Advisory Action dated 09/23/2010, the Examiner responds to Appellant's arguments that Schubert neither teaches nor suggests microstructure parts that divide a linking channel into part channels or microstructure parts in contact with the mixing zone but **not** in contact with the inlet opening. The Examiner refers Appellant to the annotated version of Schubert's Figure 2 provided in the Final Rejection. Referring to the Figure, the Examiner writes:

"The inlet openings are in contact with the admission chambers (7A and 7B), though the openings themselves are not explicitly shown or described. The part channels (at 3A and 3B) divide the admission chambers (7A, 7B) into sub-channels. These part channels are in direct contact with the mixing chamber (9C). It is noted that admission chambers (i.e. "linking channels") are shown in Figure 2."

The Advisory Action does not cite any portion of Schubert as teaching the limitation recited in the rejected claims that the microstructure parts are in contact with the mixing zone but **not** in contact with the inlet opening.

The Examiner admits that an inlet opening is "*not explicitly shown*" in Schubert and asserts that the inlet opening "*must inherently exist*." Appellant respectfully submits that the presently claimed structural components are simply absent from the Schubert reference, based upon the plain meanings of the words "*channel*," "*inlet opening*" into a channel, and dividing a channel into "*part channels*." According to the plain meanings of the words, the open chamber 7A shown in Figure 2 of Schubert is simply not equivalent to a linking channel (in the plane of the disk) that connects an inlet opening to a mixing zone and wherein the linking channel is divided into more than two part channels by microstructure parts in contact with the mixing zone but not in contact with the inlet opening of the linking channel.

Schubert provides no basis for an inferred inlet opening because Schubert discloses no structures to form such an inlet opening. Asserting that such an inlet is inherent without structure necessarily results in an interpretation of 7A in Figure 2 as simultaneously being an admission chamber, an inlet opening, and a linking channel. Appellant respectfully submits that the interpretation of a single enclosed space with no internal structures in this way is not reasonable.

Appellant respectfully submits that the rejected claims are patentable over Hemming, Schubert, and Ehrfeld under 35 U.S.C. 103(a).

3. The Examiner has not established, prima facie, that the artisan would have found the claimed invention obvious in light of the teachings of the cited references because one of ordinary skill in the art would not have been motivated to modify the static micromixer taught by Schubert according to the teachings of Ehrfeld.

The Final Rejection dated 08/17/2010 asserts that it would have been obvious to replace the pentagonal plate structure in the micromixer according to Schubert with a disk shape structure. The motivation provided by the Examiner for the modification is that doing so amounts to nothing more than the substitution of one art recognized plate design for another.

Appellant respectfully submits that the suggested modification of the Schubert plates to be disk-shaped rather than pentagonally shaped would render the Schubert invention inoperable for its intended purpose. According to Schubert, column 2, line 53, to column 3, line 32, a pentagonal shape is required to provide flat faces such that passages between an inlet chamber and a mixing zone are in the form of rows of parallel, arced passages of equal length. Column 3, lines 39-52, provides the only description of manufacturing the plates for the Schubert micromixer and describes the manufacture of pentagonal plates. Furthermore, Schubert discloses that the pentagonal plate geometry specifically has the advantage of achieving a packing density of passage openings of several thousand per square centimeter (Column 2, lines 10-24).

Column 2, lines 2-24, in Schubert teaches that the structure of the flow guide forms curved, parallel passages, all having the same length and that the passages lead fluid into the mixing chamber to obtain uniform mixing over the whole passage outlet area with no unused clearance volumes in the guide structure. The packing density of passage openings of the invention is several thousand openings per square centimeter.

An explicit correlation between pentagonal shape and curved, parallel passages, all having the same length is mathematically described in Column 3, lines 7-32, in Schubert. The description includes leg face areas, side surfaces, arc-like curved passages, a formula for constant arc-length, and the substitution of curved face areas with flat face areas. Schubert also discloses that the pentagonal shapes are formed from starting material that has a disk shape. In view of Schubert's teaching only pentagonally-shaped foils, the specific correlations made between pentagonal foil

structure and micromixer function, and explicit teaching of a mathematical formula used to replace curved faces with flat faces, one of ordinary skill in the art would reasonably be certain that pentagonally-shaped foils are critical to the function of the Schubert micromixer.

In view of the foregoing, Appellant respectfully submits that one of skill in the art would reasonably understand that changing the shape of the Schubert foils from pentagonal to round (i.e. disk-shaped) would render the Schubert micromixer inoperable for its intended purpose, which is to provide uniform mixing over the whole passage outlet area with no unused clearance volumes in the guide structure.

Appellant also argues that it would also not have been obvious to modify the micromixer taught by Ehrfeld to have the channel geometry taught by Schubert because Ehrfeld teaches a micromixer that requires a specific linking channel geometry that correlates with the function of providing identical volumetric flows for each fluid at the respective microchannel outflows (abstract, [0012], [0051]). This is accomplished by a sequential bifurcation that has a minimum of two stages of bifurcation. This means that Ehrfeld has one inlet opening and at least four outlet openings for transferring fluid to the mixing chamber. This leaves a great deal of "dead space" that is not compatible with a high packing density for outlet openings as taught by Schubert. High density outlet openings and uniform mixing over the entire outlet surface are critical to the Schubert mixer, which is accomplished by parallel, unbranched, curved passages all having the same length.

One of ordinary skill in the art would have had no reason to modify Ehrfeld according to Schubert to replace the bifurcating passages with parallel, unbranched, curved passages all having the same length because there would have been no reason to believe that this would result in identical flow volumes for all of the passages.

C. Claim 2

The rejection of claim 2 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 2 depends from and includes the limitations recited in claim 1. Therefore, the rejection of claim 2 is without appropriate basis for at least the reasons set forth by Appellant with respect to claim 1.

Appellant respectfully submit that the rejection of claim 2 under 35 U.S.C. § 103(a) should be withdrawn.

D. Claim 3

The rejection of claim 2 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellants note that claim 3 depends from claim 2 and includes the limitations recited in claims 1 and 2. Therefore, the rejection of claim 3 is without appropriate basis for at least the reasons set forth by Appellants with respect to claims 1 and 2.

Additionally, the Final Rejection dated 08/17/2010 cites Ehrfeld as teaching subsidiary channels extending through a stack of disks. No explanation whatsoever is provided for why one of ordinary skill would have been motivated to modify the

pentagonal shape plates of Schubert and modified to be round according to Ehrfeld to be further modified to contain subsidiary channels according to Ehrfeld. Appellant respectfully points out that the rejection of claim 1 does not even assert that one of ordinary skill would have been motivated to modify the channel structure taught by Schubert, let alone the inclusion of subsidiary channels which are absent from Schubert. Appellant respectfully suggests that chamber 7A in Schubert cannot reasonably be interpreted as equivalent to the subsidiary channel recited in claim 3, which runs through the tack of disks, in addition to being equivalent to the linking channel and inlet opening recited in present claim 1, which are separate structures disposed within the plane of a disk.

In the Advisory Action dated 09/23/2010, the Examiner provides no response to the above argument other than stating that the arguments have already been addressed.

Appellants respectfully submit that the rejection of claim 3 under 35 U.S.C. § 103(a) should be withdrawn.

E. Claim 4

The rejection of claim 4 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 4 depends from claim 3 and includes the limitations recited in claims 1, 2, and 3. Therefore, the rejection of claim 4 is without appropriate basis for at least the reasons set forth by Appellants with respect to claims 1-3.

Additionally, Appellant points out that the rejection of claim 4 does not address the limitations of claim 3 from which claim 4 depends. Claim 4 further limits the method with regard to how the main channel and subsidiary channels are used. The rejection also fails to address the limitation that an extracting agent is introduced into the main channel. Shubert does not teach or suggest a main channel, subsidiary channels, or introducing an extraction agent. Hemming does not teach or suggest a micromixer. Ehrfeld does not teach or suggest a introducing an extraction agent into a main channel to extract a substance introduced into the mixer via subsidiary channels.

In the Advisory Action dated 09/23/2010, the Examiner provides no response to the above argument other than stating that the arguments have already been addressed.

Appellants respectfully submit that the rejection of claim 4 under 35 U.S.C. § 103(a) should be withdrawn.

F. Claim 5.

The rejection of claim 5 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 5 depends from and includes the limitations recited in claim 1. Therefore, the rejection of claim 5 is without appropriate basis for at least the reasons set forth by Appellant with respect to claim 1.

Additionally, Appellant argues that Schubert does not teach or suggest part channels as recited in present claim 1. Column 2, lines 49-62, clearly teach that the

grooves and passages all extend from the mixing zone face of the guide structure to the admission chamber face of the guide structure. Consequently, Shubert could not have motivated one of ordinary skill in the art to select a particular part channel width.

In the Advisory Action dated 09/23/2010, the Examiner provides no response to the above argument other than stating that the arguments have already been addressed.

Appellants respectfully submit that the rejection of claim 5 under 35 U.S.C. § 103(a) should be withdrawn.

G. Claim 6.

The rejection of claims 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 6 depends from and includes the limitations recited in claim 1. Therefore, the rejection of claim 6 is without appropriate basis for at least the reasons set forth by Appellant with respect to claim 1.

Appellant argues that, because the Schubert fluid admission chamber 7A is equated with both the presently recited linking channel and the presently recited inlet opening, a ratio between their widths cannot exist. If the fluid admission chamber 7A is equated only with the presently recited linking channel, then there is no structure in Schubert corresponding to the inlet opening that is linked to the mixing zone by the linking channel.

In the Advisory Action dated 09/23/2010, the Examiner reiterates that the admission chambers 7A, 7B in Schubert's micromixer are considered by the Examiner to be equivalent to the presently recited linking channel. Given this interpretation, there can be no inlet opening in the plane of the disk in addition to the linking channel as recited in present claim 1. The linking channel, as recited, connects an inlet opening with a mixing zone; interpreting the linking channel and inlet opening to be one and the same is in contradiction to the plain meaning of the claim recitation.

The Examiner's response does not address the central point raised by Appellant that the Schubert fluid admission chamber 7A has been equated with both the inlet opening and the linking channel.

Appellant also submits that the language of the rejection does not make grammatical sense. In the Advisory Action dated 09/23/2010, the Examiner responds, in part, that the language in the rejection was taken directly from the recited claim. It appears that the Examiner interpreted Appellant's argument to mean that only the portion of the rejection in which the Examiner restates the claim recitation does not make grammatical sense. To be more precise, Appellant argues that the portion of the rejection in parentheses makes no grammatical sense.

Appellants respectfully submit that the rejection of claim 6 under 35 U.S.C. § 103(a) should be withdrawn.

H. Claims 7 and 8.

The rejection of claims 7 and 8 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claims 7 and 8 depend from and include the limitations recited in claim 1. Therefore, the rejection of claims 7 and 8 is without appropriate basis for at least the reasons set forth by Appellant with respect to claim 1.

Appellants respectfully submit that the rejection of claims 7 and 8 under 35 U.S.C. § 103(a) should be withdrawn.

I. Claims 9-12

The rejection of claims 9-12 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellants note that claims 9-12 depend from and include the limitations recited in claim 1. Therefore, the rejection of claims 9 and 10 is without appropriate basis for at least the reasons set forth by Appellants with respect to claim 1.

Appellants respectfully submit that the rejection of claims 9 and 10 under 35 U.S.C. § 103(a) should be withdrawn.

J. Claim 13

The rejection of claim 13 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision

of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 13 depends from and includes the limitations recited in claim 1. Therefore, the rejection of claim 6 is without appropriate basis for at least the reasons set forth by Appellant with respect to claim 1.

Additionally, Appellant argues that The Examiner has not established, *prima facie*, that the artisan would have found the claimed invention obvious in light of the teachings of the cited references because the Examiner has not articulated a motivation to combine the teachings as asserted or that one would have had a reasonable expectation of success.

Claim 13 recites the limitation "*the outlet openings (4) of the two linking channels (3) are disposed opposite one another.*"

The rejection of claim 1 asserts that it would have been obvious to modify the micromixer of Schubert according to Ehrfeld to make the Schubert plate in the form of a disk. Appellant argues hereinabove that this modification is incompatible with the Schubert micromixer. In the rejection of claim 13, merely asserts that Ehrfeld teaches outlet openings of two linking channels that are opposite one another. The Examiner presents no line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. No motivation for the asserted modifications.

Appellants respectfully submit that the rejection of claim 13 under 35 U.S.C. § 103(a) should be withdrawn.

K. Claims 14 and 15

The rejection of claims 14 and 15 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claims 14 and 15 depend from and includes the limitations recited in claim 1. Therefore, the rejection of claims 14 and 15 is without appropriate basis for at least the reasons set forth by Appellants with respect to claim 1.

Appellants respectfully submit that the rejection of claims 14 and 15 under 35 U.S.C. § 103(a) should be withdrawn.

L. Claims 16-18

The rejection of claims 16-18 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellants note that claims 16-18 depend from and include the limitations recited in claims 1 and 3. Therefore, the rejection of claims 16-18 is without appropriate basis for at least the reasons set forth by Appellants with respect to claims 1 and 3.

Appellant respectfully submits that the rejection of claims 16-18 under 35 U.S.C. § 103(a) should be withdrawn.

M. Claims 18 and 19

The rejection of claim 18 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claims 18 and 19 depend from and include the limitations recited in claim 1. Therefore, the rejection of claims 18 and 19 is without appropriate basis for at least the reasons set forth by Appellants with respect to claim 1.

Appellant respectfully submits that the rejection of claims 18 and 19 under 35 U.S.C. § 103(a) should be withdrawn.

N. Claim 21

The rejection of claim 20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 21 depends from and includes the limitation recited in claim 20. Therefore, the rejection of claim 20 is without appropriate basis for at least the reasons set forth by Appellants with respect to claim 20.

Appellant respectfully submits that the rejection of claim 21 under 35 U.S.C. § 103(a) should be withdrawn.

O. Claim 23

The rejection of claims 23 under 35 U.S.C. § 103(a) as allegedly being unpatentable over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), the decision of the Examiner to finally reject this claim should be reversed, and the application should be remanded to the Examiner.

Appellant notes that claim 23 depends from and includes the limitation recited in claim 22. Therefore, the rejection of claim 23 is without appropriate basis for at least the reasons set forth by Appellants with respect to claim 22.

Appellant respectfully submit that the rejection of claim 16 under 35 U.S.C. § 103(a) should be withdrawn.

VIII. CONCLUSION

Appellant respectfully submits that, for at least the foregoing reasons, the Examiner has failed to establish that claim 1-23 are indefinite under 35 U.S.C. 112, second paragraph. The Board is, therefore, respectfully requested to reverse the Examiner's rejection of claims 1-23, and to allow the application to issue in its present form.

Appellant respectfully submits that, for at least the foregoing reasons, the Examiner has failed to establish that claim 1-23 are obvious over **Stemming** (ISBN 3-8023-0084-X, pp158-9) in view of **Schubert** et al. (US 6,082,891) and in further view of **Ehrfeld** et al. (US 2003/0039169), which is a prerequisite for maintaining a rejection under 35 U.S.C. § 103(a). The Board is, therefore, respectfully requested to reverse the Examiner's rejection of claims 1-23, and to allow the application to issue in its present form.

Respectfully Submitted,
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IX. CLAIMS APPENDIX

1. A process for extracting a substance from one of at least two immiscible fluid phases comprising the steps of:

a) providing at least a first fluid and a second fluid that, after mixing, form at least two immiscible fluid phases, wherein the first fluid contains at least one substance that is extractable by the second fluid;

b) mixing the first fluid and second fluid by means of at least one static micromixer; and

c) allowing the at least two immiscible fluid layers to separate
wherein:

said at least one static micromixer comprises at least one component in the form of a disk (1);

said disk (1) comprises a single mixing zone (5), at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream directly into said single mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk;

said linking channel (3) is divided once into more than two part channels (7) by microstructure parts (6) immediately prior to opening into the mixing zone (5), and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone (5); and

said microstructure parts (6) are in contact with said mixing zone but not with said at least one inlet opening (2).

2. The process as defined in claim 1, wherein the micromixer comprises a housing (11) at least 2 fluid inlets (12a), and at least one fluid outlet (16), and the housing (11) contains two or more of said at least one component in the form of a disk (1) arranged into a stack.

3. The process as defined in claim 2, wherein a plurality of disks (1) are superposed on one another so that the inlet openings (2) form subsidiary channels for introducing the liquid phase that is to be mixed, the mixing zones (5) together form a main channel for removing the mixed phase and the main channel and subsidiary channels extend through the stack.
4. The process as defined in claim 3, wherein an extraction agent is introduced into and conveyed through the main channel and the first fluid containing the substance to be extracted is conveyed through at least one subsidiary channel of the micromixer.
5. The process as defined in claim 1, wherein, at the outlet into the mixing zone (5), the widths of the part channels (7) of the disks (1) are from 1 μm to 2 mm.
6. The process as defined in claim 1, wherein the ratio of the greatest width of the linking channel (3) and/or the width of the inlet opening (2) to the width of the part channels (7) of the at least one disk (1) is greater than 2.
7. The process as defined in claim 1, wherein the ratio of the length to the width of the part channels (7) of the at least one disk (1) is from 1:1 to 20:1.
8. The process as defined in claim 1, wherein the ratio of the width of the mixing zone (5) to the width of the part channels (7) of the at least one disk (1) is greater than 2.
9. The process as defined in claim 1, wherein the at least one disk (1) is additionally provided with at least one flow-through opening (9).
10. The process as defined in claim 1 wherein at least one of the inlet openings (2) or flow-through openings (9) or the mixing zone (5) of the at least one disk (1) is enclosed by the plane of the disk and the linking channel (3) is formed by an indentation.

11. The process as defined in claim 1, wherein at least one of the inlet openings (2) or flow-through openings (9) or the mixing zone (5) of the at least one disk (1) is disposed at the edge of the disk or as a recess at the edge of the disk.

12. The process as defined in claim 1, wherein the at least one disk (1) is provided with at least two inlet openings (2) for at least two different fluid streams and each inlet opening (2) is connected with the mixing zone (5) through a linking channel (3).

13. The process as defined in claim 1, wherein the at least one disk (1) is provided with two inlet openings (2) for two different fluid streams, each inlet opening (2) being connected with the mixing zone (5) through a linking channel (3), and the outlet openings (4) of the two linking channels (3) are disposed opposite one another.

14. The process as defined in claim 1, wherein the outlet openings (4) of the at least one disk (1) are arranged on a circular line.

15. The process as defined in claim 1, wherein the at least one disk (1) is provided with additional through-holes (12) and additional part channels (13) that are integrated into the microstructure parts (6) and are separated from the part channels (7).

16. (previously presented) The process as defined in claim 3, wherein the linking channels (3) of the disks (1) are formed by indentations, and the linking channels (3) before opening into the mixing zone (5) are divided into part channels (7) by the microstructure parts (6) disposed on the disks (1).

17. The process as defined in claim 3, wherein the linking channels (3) of the disks (1) are formed by recesses in the disks (1), the disks being disposed as intermediate disks between a cover disk and a bottom disk, and the linking channels (3) before opening into the mixing zone (5) are divided into part channels (7) by microstructure parts (6) disposed on the cover disks and/or bottom disks.

18. The process as defined in claim 1, wherein the flow rate of the fluid stream into the mixing zone (5) is greater than the flow rate of the fluid mixture within the mixing zone.

19. The process as defined in claim 1, wherein the mixing in the mixing zone occurs at least in part by turbulence.

20. A process for extracting a substance from one of at least two immiscible fluid phases comprising the steps of:

a) providing at least a first fluid and a second fluid that, after mixing, form at least two immiscible fluid phases, wherein the first fluid contains at least one substance that is extractable by the second fluid;

b) mixing the first fluid and second fluid by means of at least one static micromixer; and

c) allowing the at least two immiscible fluid layers to separate
wherein:

said at least one static micromixer comprises at least one component in the form of a disk (1);

said disk (1) comprises a single mixing zone (5), at least one inlet opening (2) disposed in a plane of said disk for introduction of at least one feed stream into a linking channel (3) and with at least one outlet opening (4) disposed in the plane of said disk for outflow of the feed stream directly into said single mixing zone (5), said at least one inlet opening (2) being connected with said at least one outlet opening (4) in a communicating manner via said linking channel (3) which is disposed in the plane of said disk;

said linking channel (3) is divided once into more than two part channels (7) by microstructure parts (6) immediately prior to opening into the mixing zone (5), and each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and a length that is sufficient for flow control but which minimizes pressure for a given throughput and said width is smaller than a width of the mixing zone (5); and

said microstructure parts (6) are not in contact with said at least one inlet opening (2).

21. The process as defined in claim 20, wherein a length-to-width ratio of each of the part channels (7) is 8:1 to 12:1 and a width of each of the part channels is from 5 μm to 250 μm .

22. A process for extracting a substance from one of at least two immiscible fluid phases, said process comprising the steps of:

a) delivering a first feed stream of a first fluid from a first inlet opening (2) of a static micromixer through a first linking channel (3) to a first outlet opening (4) and directly into a mixing zone (5) of said micromixer, said first feed stream being divided only by microstructure parts (6) into part channels (7) immediately prior to entering said mixing zone (5);

b) delivering a second feed stream of a second fluid to said mixing zone (5);

c) mixing the first fluid stream with the second fluid stream in the mixing zone (5);

and

d) allowing the first and second fluids to separate

wherein:

said first fluid and said second fluid are immiscible and said substance is extracted from the first fluid into the second fluid or said substance is extracted from the second fluid into the first fluid;

said static micromixer comprises at least one component in the form of a disk (1);

said disk (1) comprises a single mixing zone (5);

said first inlet opening (2), said first outlet opening (4), and said first linking channel (3) are disposed in the plane of said disk;

each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone (5); and

said microstructure parts (6) are in contact with said mixing zone but not with said at least one inlet opening (2).

23. The process as defined in claim 22, wherein said second feed stream is delivered from a second inlet opening (2) of said static micromixer through a second linking channel (3) to a second outlet opening (4) and directly into said mixing zone (5) of said

micromixer, said second feed stream being divided only by microstructure parts (6) into part channels (7) immediately prior to entering said mixing zone (5);
wherein:

said static micromixer comprises at least one component in the form of a disk (1);

said disk (1) comprises a single mixing zone (5);

said second inlet opening (2), said second outlet opening (4), and said second linking channel (3) are disposed in the plane of said disk;

each of the part channels (7) has a respective width in a millimeter to sub-millimeter range and said width is smaller than a width of the mixing zone (5); and

said microstructure parts (6) are in contact with said mixing zone.